Kramer Electronics, Ltd.

USER MANUAL

Model:

VS-48H

4x8 HDMI Matrix Switcher

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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation and broadcasting professional on a daily basis. In recent years we have redesigned and upgraded most of our line, making the best even better! Our 1,000-plus different models now appear in 11 groups[1] that are clearly defined by function.

Congratulations on purchasing your Kramer **VS-48H** *4x8 HDMI Matrix Switcher*.

The **VS-48H** is ideal for conference room presentations and advertising applications as well as for rental and staging.

Each package includes the following items:

- **VS-48H** *4x8 HDMI Matrix Switcher*
- Power cord
- Windows®-based Kramer control software[2]
- Windows®-based Ethernet Configuration Manager and Virtual Serial Port Manager
- Kramer **RC-IR3** Infrared Remote Control Transmitter (including the required batteries and a separate user manual[3])
- This user manual[3]

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high performance high resolution cables[4]

1 GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Products

2 Downloadable from http://www.kramerelectronics.com

3 Download up-to-date Kramer user manuals from http://www.kramerelectronics.com

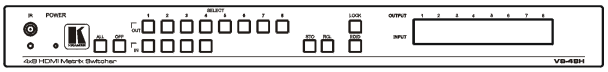
4 The complete list of Kramer cables is available from http://www.kramerelectronics.com

2.1 Quick Start

This quick start chart summarizes the basic setup and operation steps.

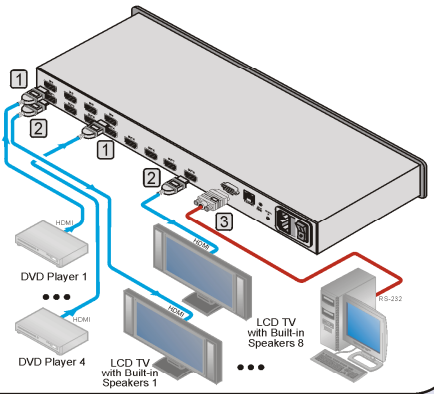
Step 1: Mount the device - see Section 5

Mount the device in a rack or stick the 4 rubber feet to the underside



Step 2: Connect the inputs and outputs - see Section 6

1. Connect the inputs
2. Connect the outputs
3. Optional—Connect a PC via RS-232 and/or Ethernet for remote operation



Step 3: Turn the power ON

Step 4: Operate the device - see Section 7

Switch an Input to an Output

Press an output button followed by an input button to switch the pair

Acquire the EDID from:

- ❒ A connected output
- ❒ Several outputs
- ❒ The default EDID

Store and Recall a Preset

To Store:
1. Set the device to the desired setting.
2. Press the STO button. The STO button blinks.
3. Select an IN or OUT button to store the device setting.
4. Press the LOCK button to store the current setup.

To Recall:
1. Press the RCL button. The RCL button blinks.
2. Press the relevant OUT button.
3. Press the LOCK button to recall the stored setting.

Step 5: Operate the device - see Section 7

Operate via the front panel buttons, IR remote control, RS-232 and Ethernet

3 Overview

The **VS-48H** is a high quality 4 x 8 matrix switcher for HDMI signals that fits into one vertical space of a standard 19" professional rack enclosure.

In particular, the **VS-48H** features:

- Up to 2.25Gbps bandwidth per graphic channel[1]
- Support for HDCP (High Definition Digital Content Protection)
- HDMI Support – HDMI (V1.4 with 3D, Deep Color, x.v.Color™, Lip Sync)
- 3D Pass-Through
- I-EDIDPro™ Kramer Intelligent EDID Processing™ – Intelligent EDID handling & processing algorithm ensures Plug and Play operation for HDMI systems
- Kramer reKlocking™ & Equalization Technology that rebuilds the digital signal to travel longer distances
- A LOCK button to prevent unwanted tampering with the buttons on the front panel
- Preset memory locations for quick access to common configurations

You can control the **VS-48H** using the front panel buttons, or remotely via:

- RS-232 serial commands transmitted by a PC, touch screen system or other serial controller
- The Kramer infrared remote control transmitter
- A PC connected to the Ethernet port on the device via a LAN

3.1 Defining the EDID

The Extended Display Identification Data (EDID[2]) is a data-structure provided by a display to describe its capabilities to an HDMI source. The EDID enables the **VS-48H** to "know" what kind of monitor is connected to the output. The EDID includes the manufacturer's name, the product type, the timing data supported by the display, the display size, luminance data and (for digital displays only) the pixel mapping data. See Section 7.2 for details of how to acquire the EDID.

1 Suitable for resolutions up to UXGA at 60Hz, and for all HD resolutions

2 Defined by a standard published by the Video Electronics Standards Association (VESA)

3.2 About HDMI

High-Definition Multimedia Interface (HDMI) is an uncompressed all-digital[1] audio/video interface, widely supported in the entertainment and home cinema industry. It delivers the highest high-definition image and sound quality. Note that Kramer Electronics Limited is an HDMI Adopter and an HDCP Licensee.

In particular, HDMI:

- Provides a simple[2] interface between any audio/video source, such as a set-top box, DVD player, or A/V receiver and video monitor, such as a digital flat LCD / plasma television (DTV), over a single lengthy[3] cable
- Supports standard, enhanced, high-definition video, and multi-channel digital audio[4] on a single cable
- Transmits all ATSC HDTV standards and supports 8-channel digital audio, with bandwidth to spare to accommodate future enhancements and requirements
- Benefits consumers by providing superior, uncompressed digital video quality via a single cable[5], and user-friendly connector
- Is backward-compatible with DVI (Digital Visual Interface)
- Supports CEC, two-way communication between the video source (such as a DVD player) and the digital television, enabling new functionality such as automatic configuration and one-button play

HDMI has the capacity to support existing high-definition video formats (720p, 1080i, and 1080p, 2K and 4K), standard definition formats such as NTSC or PAL, as well as 480p and 576.

3.3 About HDCP

The High-Bandwidth Digital Content Protection (HDCP) standard[6] protects digital video and audio signals transmitted over DVI or HDMI connections between two HDCP-enabled devices to eliminate the reproduction of

1 Ensuring an all-digital rendering of video without the losses associated with analog interfaces and their unnecessary digital-to-analog conversions

2 With video and multi-channel audio combined into a single cable, the cost, complexity, and confusion of multiple cables currently used in A/V systems is reduced

3 HDMI technology has been designed to use standard copper cable construction at up to 15m

4 HDMI supports multiple audio formats, from standard stereo to multi-channel surround-sound. HDMI has the capacity to support Dolby 5.1 audio and high-resolution audio formats

5 HDMI provides the quality and functionality of a digital interface while also supporting uncompressed video formats in a simple, cost-effective manner

6 Developed by Intel

copyrighted material. To protect copyright holders (such as movie studios) from having their programs copied and shared, the HDCP standard provides for the secure and encrypted transmission of digital signals.

3.4 Recommendations for Best Performance

To achieve the best performance:

- Use only good quality connection cables[1] to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables).
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality and position your Kramer **VS-48H** away from moisture, excessive sunlight and dust

4 Defining the VS-48H 4x8 HDMI Matrix Switcher

Figure 1 and Table 1 define the **VS-48H**.

1 Available from Kramer Electronics on our Web site at http://www.kramerelectronics.com

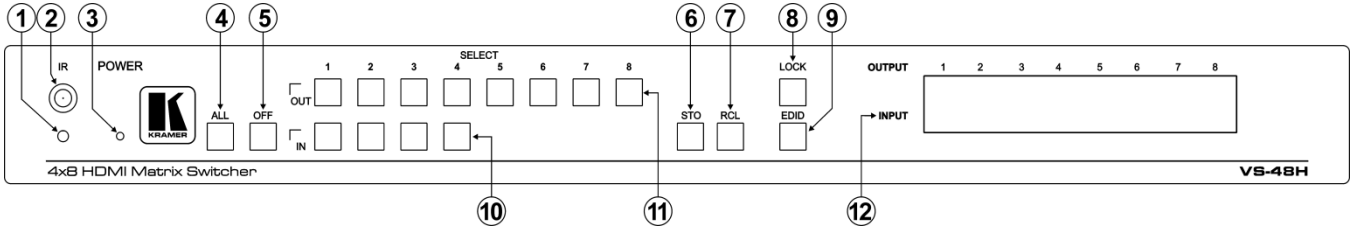


Figure 1: VS-48H 4x8 HDMI Matrix Switcher Front Panel

Table 1: VS-48H 4x8 HDMI Matrix Switcher Front Panel Features

#	Feature		Function
1	*IR* LED		Lights yellow when receiving signals from the infrared remote control transmitter
2	*IR* Receiver		Signal receiver for the Infrared remote control transmitter
3	*POWER* LED		Lights when the device is turned on
4	*ALL* Button		Press followed by an input button to connect the selected input to all outputs[1]
5	*OFF* Button		Press after pressing an output button to disconnect the selected output from the inputs. To disconnect all the outputs, press ALL followed by OFF
6	*STO* Button		Press to store the current switching setting to a preset (see Section 7.3)
7	*RCL* Button		Press to recall the current switching setting from a preset (see Section 7.3)
8	*LOCK* Button		Press and hold to toggle the locking/release of the front panel buttons. When storing or recalling presets, press to store or recall the preset (see Section 7.3)
9	*EDID* Button		Press to capture the EDID (see Section 7.2)
10	*SELECT* Buttons[2]	*IN* (1 to 4)	Press to select the input to switch after selecting an output
11		*OUT* (1 to 8)	Press to select an output to switch followed by an input
12	*INPUT* 7-segment LED Display		Displays the input currently switched to the output which is marked above each input

1 For example, press ALL and then Input button # 2 to connect input # 2 to all the outputs

2 These are also used for storing machine setups (see Section 7.3)

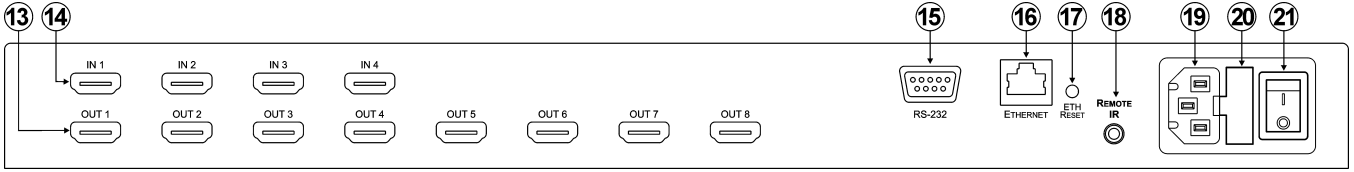


Figure 2: VS-48H 4x8 HDMI Matrix Switcher Rear Panel

Table 2: VS-48H 4x8 HDMI Matrix Switcher Rear Panel Features

#	Feature	Function
13	*OUT* HDMI Connectors (1 to 8)	Connect to up to 8 HDMI acceptors
14	*IN* HDMI Connectors (1 to 4)	Connect to up to 4 HDMI sources
15	*RS-232* 9-pin D-sub Serial Port Connector	Connect to a PC/serial controller
16	*ETHERNET* RJ-45 Connector	Connect to a PC via a LAN
17	*ETH RESET* Button	Press to reset to the factory default IP parameters[1]
18	*REMOTE IR* Opening[2]	Connect to an external IR receiver for controlling the device via and IR remote controller (see Section 4.1)
19	Mains Power Connector	Connect to the mains power
20	Mains Power Fuse	Fuse for protecting the device
21	Mains Power Switch	Switch for turning the device on or off

1 First turn the VS-48H off and then turn it on again while pressing the ETH RESET button. The device will power up and load its memory with the factory default IP parameters

2 Covered by a cap. The 3.5mm jack at the end of the internal IR connection cable fits into this opening

4.1 Using the IR Transmitter

You can use the **RC-IR3** IR transmitter to control the device via the built-in IR receiver on the front panel or, instead, via an optional external IR receiver[1]. The external IR receiver can be located 15m (49ft) away from the device. This distance can be extended to up to 60m (197ft) when used with three extension cables[2]

Before using the external IR receiver, be sure to arrange for your Kramer dealer to insert the internal IR connection cable[3] with the 3.5mm jack that fits into the REMOTE IR opening on the rear panel. Connect the external IR receiver to the REMOTE IR 3.5mm jack.

1 Model: C-A35M/IRR-50

2 Model: C-A35M/A35F-50

3 P/N: 505-70434010-S

5 Installing the VS-48H in a Rack

This section provides instructions for rack mounting the device.

Before installing in a rack, be sure that the environment is within the recommended range:

OPERATING TEMPERATURE:	0º to +55ºC (32º to 131ºF)
STORAGE TEMPERATURE:	-45º to +72ºC (-49º to 162ºF)
HUMIDITY:	10% to 90%, RHL non-condensing

CAUTION!

When installing on a 19" rack, avoid hazards by taking care that:

1. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.

2. Once rack mounted, enough air will still flow around the machine.

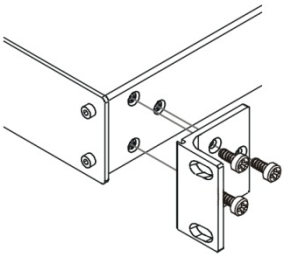
3. The machine is placed straight in the correct horizontal position.

4. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.

5. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.



2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

Note:

- In some models, the front panel may feature built-in rack ears
- Detachable rack ears can be removed for desktop use
- Always mount the machine in the rack before you attach any cables or connect the machine to the power
- If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions available from our Web site

6 Connecting the VS-48H 4x8 HDMI Matrix Switcher

To connect[1] the VS-48H 4x8 HDMI Matrix Switcher as illustrated in the example in Figure 3:

1. Connect up to four[2] HDMI sources (for example, DVD players) to the IN HDMI connectors.
2. Connect the eight[3] OUT HDMI connectors to up to eight HDMI acceptors (for example, LCD displays with built-in speakers).
3. If required, connect a PC/controller to the RS-232 port (see Section 7.4) and/or the Ethernet port (see Section 7.6).
4. Connect the device to the mains electricity (not shown in Figure 3).
5. If necessary, acquire the EDID (see Section 7.2)

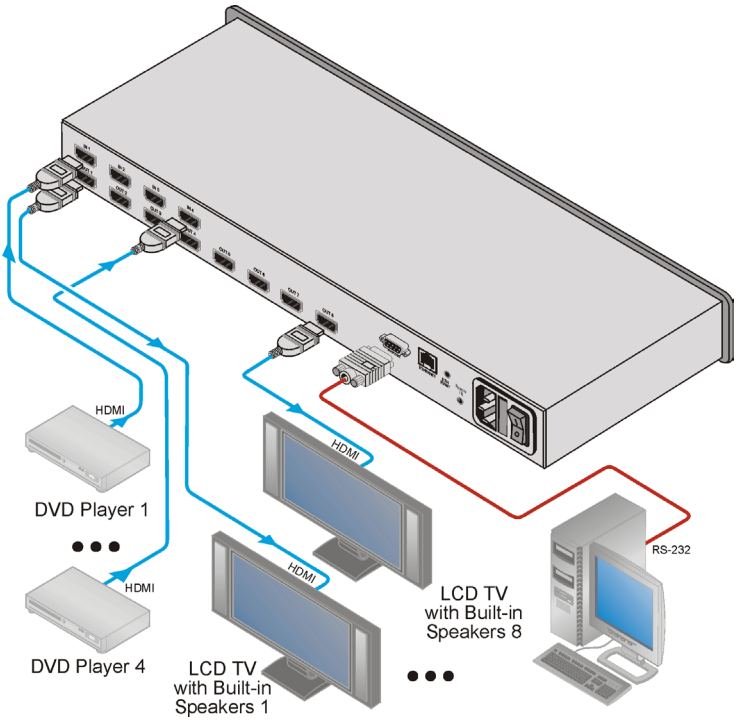


Figure 3: Connecting the VS-48H 4x8 HDMI Matrix Switcher

1 Switch off the power on each device before connecting it to your VS-48H. After connecting your VS-48H, switch on its power and then switch on the power on each device

2 You do not have to connect all the sources

3 You do not have to connect all the outputs

7 Operating the VS-48H 4x8 HDMI Matrix Switcher

This section describes:

- Switching an input to an output (see Section 7.1)
- Acquiring the EDID (see Section 7.2)
- Storing and recalling switch settings (see Section 7.3)
- Resetting the **VS-48H** (see Section 7.4)
- Connecting to the **VS-48H** via RS-232 (see Section 7.5)
- Connecting to the **VS-48H** via Ethernet (see Section 7.6)

7.1 Switching an Input to an Output

To switch an input to an output:

- Press an output button followed by an input button to switch the selected input to the selected output

7.2 Acquiring the EDID

You can acquire the EDID from any of the following:

- One output to one or more of the four inputs (see Section 7.2.1)
- Several outputs and inputs simultaneously (see Section 7.2.2)
- The default EDID (see Section 7.2.3)

Note: Attempting to acquire the EDID from an output that does not have a display device connected to it results in the default EDID being acquired.

7.2.1 Acquiring the EDID from One Output

Note: You can assign the EDID from one output to any or all of the four inputs.

To acquire the EDID from a display device connected to one of the outputs:

1. Press the EDID and STO buttons simultaneously and hold them for 3 seconds.
   Both buttons flash.
2. Press the input button to which the EDID will be copied.
   The selected input number flashes on the display.
3. Select the output from which the EDID is to be acquired.
4. Press the EDID button.
   The EDID is stored when the display returns to normal and the EDID and STO buttons stop flashing.

7.2.2 Acquiring the EDID from Several Outputs

To acquire the EDID from several outputs (for example, OUT 1 to IN 1 and OUT 6 to IN 3):

1. Connect the display devices to the outputs from which you want to acquire the EDIDs.
2. Press the EDID and STO buttons simultaneously and hold them for 3 seconds.
   Both buttons flash.
3. Press the input button to which the EDID will be copied (for example, IN 1).
   The selected input number flashes on the display.
4. Select the output from which the EDID will be acquired (for example, OUT 1).
5. Press the IN 1 button.
   The IN 1 button stops flashing.
6. Press the next input button to which the EDID will be copied (for example, IN 3).
   The selected input number flashes on the display.
7. Select the output from which the EDID will be acquired (for example, OUT 6).
8. Press the IN 3 button.
   The IN 3 button stops flashing.
9. Press the input buttons to which you want to copy the EDID (for example, IN 1 and IN 3).
10. Make sure that the relevant input numbers flash on the display.
11. Press the EDID button.
    The process is complete when the display returns to normal.

7.2.3 Acquiring the Default EDID

To store the default EDID on a selected input (for example, Input 2):

1. Press the EDID and STO buttons simultaneously and hold them for 3 seconds.
   Both buttons flash.
2. Press the input (for example, Input 2) to which the EDID is to be copied.
   The selected input number flashes on the display.
3. Press the OFF button until "0" (zero) appears on the display.
4. Press the EDID button.
   The default EDID is stored on the selected input when the display returns to normal.

7.3 Storing and Recalling a Switching Setting from a Preset

The STO and RCL buttons are used to store and recall up to 12 setups which are assigned using the 8 output (preset 1 to 8) and 4 input (preset 9 to 12) buttons.

To store a preset[1] (for example, Input 4/Output 3 in preset 10):

1. Configure the switching as required for the preset (for example, Input 4 to Output 3).
2. Press the STO button.
   The STO button flashes.
3. Select an OUT or IN SELECT button to store the device setting (for example, IN 2 for preset 10).
4. Press the LOCK button[2] to store the current setup.

To recall a preset (for example, preset 10):

1. Press the RCL button.
   The RCL button flashes.
2. Press the relevant OUT or IN button that stored the preset (for example, IN 2/preset 10).
3. Press the LOCK button to recall the stored preset.
   The RCL button stops flashing.

7.4 Resetting the VS-48H 4x8 HDMI Matrix Switcher's IP Parameters

Note: This procedure resets only the IP related parameters. All switching and preset values remain unchanged.

To reset the IP parameters to their default values (see Table 4):

- Press and hold the ETH Reset button on the rear panel while powering up the device

7.5 Connecting to the VS-48H 4x8 HDMI Matrix Switcher via RS-232

You can connect to the **VS-48H** via an RS-232 connection using, for example, a PC. Note that a null-modem adapter/connection is not required.

To connect to the product via RS-232:

- Connect the RS-232 9-pin D-sub on the rear panel of the **VS-48H** via a 9-wire straight cable (only pin 2 to pin 2, pin 3 to pin 3, and pin 5 to pin 5 need to be connected) to the RS-232 9-pin D-sub port on your PC

1 You can set each of the inputs/outputs independently; you are not limited to a single input/output combination

2 You have to press the LOCK button within 10 seconds or the procedure automatically times out

7.6 Connecting to the VS-48H 4x8 HDMI Matrix Switcher via Ethernet

You can connect the **VS-48H** via the Ethernet, using a crossover cable (see Section 7.6.1) for direct connection to the PC or a straight through cable (see Section 7.6.2) for connection via a network hub or network router[1].

7.6.1 Connecting the Ethernet Port directly to a PC

You can connect the Ethernet port of the **VS-48H** to the Ethernet port on your PC via a crossover cable with RJ-45 connectors.

This type of connection is recommended for identification of the factory default IP Address of the **VS-48H** during the initial configuration

After connecting the Ethernet port, configure your PC as follows:

1. On your desktop, right-click the **My Network Places** icon.
2. Select **Properties**.
3. Right-click Local Area Connection Properties.
4. Select **Properties**.
   The Local Area Connection Properties window appears.
5. Select the Internet Protocol (TCP/IP) and click the **Properties** Button (see Figure 4).

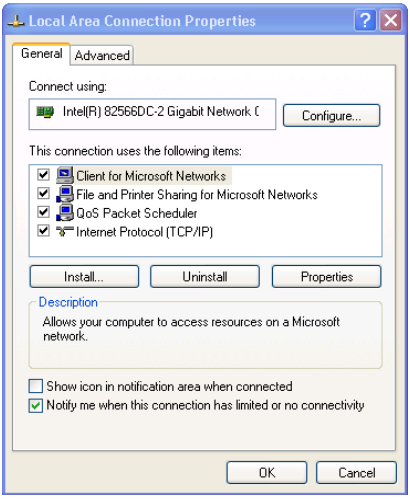


Figure 4: Local Area Connection Properties Window

1 After connecting the Ethernet port, you have to install and configure your Ethernet Port. For detailed instructions, see the "Ethernet Configuration (FC-11) guide.pdf" file in the technical support section at http://www.kramerelectronics.com

6. Select Use the following IP Address, and fill in the details as shown in Figure 5.
7. Click **OK**.

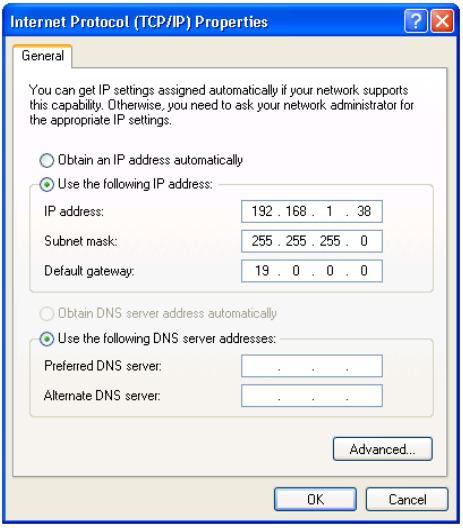

Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 1 . 38
Subnet mask: 255 . 255 . 255 . 0
Default gateway: 19 . 0 . 0 . 0
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

Figure 5: Internet Protocol (TCP/IP) Properties Window

7.6.2 Connecting the Ethernet Port via a Network Hub

You can connect the Ethernet port of the **VS-48H** to the Ethernet port on a network hub or network router, via a straight through cable with RJ-45 connectors.

8 Upgrading the Firmware

For instructions on upgrading the firmware see "*Upgrading the VS-48H Firmware Using the STC Software*".

9 Technical Specifications

The **VS-48H** technical specifications are shown in Table 3.

Table 3: Technical Specifications[1] of the VS-48H 4x8 HDMI Matrix Switcher

INPUTS:	4 HDMI Connectors
OUTPUTS:	8 HDMI Connectors
BANDWIDTH:	2.25Gbps bandwidth per graphic channel
COMPLIANCE WITH HDMI STANDARD:	HDMI and HDCP
RESOLUTION:	Up to UXGA; 1080p
POWER SOURCE:	100–240V AC, 50/60Hz, 33VA
CONTROLS:	Front panel buttons, infrared remote control transmitter, RS-232, Ethernet
DIMENSIONS:	19" x 10.9" x 1U (W, D, H)
WEIGHT:	2.1kg (4.6lbs) approx.
ACCESSORIES:	Power cord, IR transmitter, rack "ears"
OPTIONS:	Kramer HDMI cables[2], external remote IR receiver cable

10 Default EDID

Monitor
- Model name..... VS-48H
- Manufacturer..... KRM
- Plug and Play ID..... KRM0200
- Serial number..... 1
- Manufacture date..... 2010, ISO week 24
- ---
- EDID revision..... 1.3
- Input signal type..... Digital (DVI)
- Color bit depth..... Undefined
- Display type..... RGB color
- Screen size..... 700 x 390 mm (31.5 in)
- Power management..... Not supported
- Extension blocs..... 1 (CEA-EXT)
- ---
- DDC/CI..... Not supported

Color characteristics
- Default color space..... Non-sRGB
- Display gamma..... 2.20
- Red chromaticity..... Rx 0.640 - Ry 0.341
- Green chromaticity..... Gx 0.286 - Gy 0.610
- Blue chromaticity..... Bx 0.146 - By 0.069
- White point (default).... Wx 0.284 - Wy 0.293
- Additional descriptors... None

1 Specifications are subject to change without notice

2 For best results, use Kramer cables such as the C-HM/HM series, the C-HM/DM series and/or our HDMI over fiber optics C-FOHM/FOHM series

Timing characteristics
Horizontal scan range.... 31-94kHz
Vertical scan range..... 50-85Hz
Video bandwidth..... 170MHz
CVT standard..... Not supported
GTF standard..... Not supported
Additional descriptors... None
Preferred timing..... Yes
Native/preferred timing.. 1280x720p at 60Hz
Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 746 +hsync -vsync
Detailed timing #1..... 1920x1080p at 60Hz (16:9)
Modeline..... "1920x1080" 148.500 1920 2008 2052 2200 1080 1084 1089 1125 +hsync +vsync

Standard timings supported
720 x 400p at 70Hz - IBM VGA
720 x 400p at 88Hz - IBM XGA2
640 x 480p at 60Hz - IBM VGA
640 x 480p at 67Hz - Apple Mac II
640 x 480p at 72Hz - VESA
640 x 480p at 75Hz - VESA
800 x 600p at 56Hz - VESA
800 x 600p at 60Hz - VESA
800 x 600p at 72Hz - VESA
800 x 600p at 75Hz - VESA
832 x 624p at 75Hz - Apple Mac II
1024 x 768i at 87Hz - IBM
1024 x 768p at 60Hz - VESA
1024 x 768p at 70Hz - VESA
1024 x 768p at 75Hz - VESA
1280 x 1024p at 75Hz - VESA
1152 x 870p at 75Hz - Apple Mac II
1280 x 720p at 60Hz - VESA STD
1280 x 800p at 60Hz - VESA STD
1440 x 900p at 60Hz - VESA STD
1280 x 960p at 60Hz - VESA STD
1280 x 1024p at 60Hz - VESA STD
1400 x 1050p at 60Hz - VESA STD
1680 x 1050p at 60Hz - VESA STD
1600 x 1200p at 60Hz - VESA STD

EIA/CEA-861 Information
Revision number..... 3
IT underscan..... Not supported
Basic audio..... Supported
YCbCr 4:4:4..... Not supported
YCbCr 4:2:2..... Not supported
Native formats..... 1
Detailed timing #1..... 720x480p at 60Hz (4:3)
Modeline..... "720x480" 27.000 720 736 798 858 480 489 495 525 -hsync -vsync
Detailed timing #2..... 1920x1080i at 60Hz (16:9)
Modeline..... "1920x1080" 74.250 1920 2008 2052 2200 1080 1084 1094 1124 interlace +hsync +vsync
Detailed timing #3..... 1920x1080i at 50Hz (16:9)
Modeline..... "1920x1080" 74.250 1920 2448 2492 2640 1080 1084 1094 1124 interlace +hsync +vsync
Detailed timing #4..... 1280x720p at 60Hz (16:9)
Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync

Detailed timing #5..... 1280x720p at 50Hz (16:9)
Modeline..... "1280x720" 74.250 1280 1720 1760 1980 720 725 730 750 +hsync +vsync

CE video identifiers (VICs) - timing/formats supported
720 x 576p at 50Hz - EDTV (4:3, 16:15)
1280 x 720p at 50Hz - HDTV (16:9, 1:1)
1920 x 1080i at 60Hz - HDTV (16:9, 1:1)
1920 x 1080i at 50Hz - HDTV (16:9, 1:1)
1280 x 720p at 60Hz - HDTV (16:9, 1:1) [Native]
1920 x 1080p at 60Hz - HDTV (16:9, 1:1)
1920 x 1080p at 50Hz - HDTV (16:9, 1:1)
NB: NTSC refresh rate = (Hz*1000)/1001

CE audio data (formats supported)
LPCM 3-channel, 24-bits at 44/48 kHz

CE speaker allocation data
Channel configuration.... 3.0
Front left/right..... Yes
Front LFE..... No
Front center..... Yes
Rear left/right..... No
Rear center..... No
Front left/right center.. No
Rear left/right center... No
Rear LFE..... No

CE vendor specific data (VSDB)
IEEE registration number. 0x000C03
CEC physical address..... 1.0.0.0
Maximum TMDS clock..... 165MHz

Report information
Date generated..... 08/03/2011
Software revision..... 2.52.0.857
Data source..... Real-time 0x0031
Operating system..... 5.1.2600.2.Service Pack 3

11 Default Communication Parameters

Table 4: Default Communication Parameters

EDID	
EDID data is passed between Output 1 and Input 1	
RS-232	
Protocol 2000	
Baud Rate:	9600
Data Bits:	8
Stop Bits:	1
Parity:	None
Command Format:	HEX
Example (Output 1 to Input 1):	0x01, 0x81, 0x81, 0x81
Ethernet	
Default Settings	
IP Address:	192.168.1.39
Subnet Mask:	255.255.255.0
Default Gateway:	192.168.1.1
TCP Port:	5000
UDP Port:	50000

12 Kramer Protocol 2000

The **VS-48H** is compatible with Kramer's Protocol 2000[1] (version 0.50). This RS-232/RS-485 communication protocol uses four bytes of information as defined below.

Table 5: Protocol Definitions

MSB							LSB
	DESTI-NATION	**INSTRUCTION**					
0	D	N5	N4	N3	N2	N1	N0
7	6	5	4	3	2	1	0
1st byte							
	INPUT						
1	I6	I5	I4	I3	I2	I1	I0
7	6	5	4	3	2	1	0
2nd byte							
	OUTPUT						
1	O6	O5	O4	O3	O2	O1	O0
7	6	5	4	3	2	1	0
3rd byte							
		MACHINE NUMBER					
1	OVR	X	M4	M3	M2	M1	M0
7	6	5	4	3	2	1	0
4th byte							

1st BYTE: Bit 7 – Defined as 0.
D – "DESTINATION": 0 - for sending information to the switchers (from the PC);
1 - for sending to the PC (from the switcher).
N5…N0 – "INSTRUCTION"
The function that is to be performed by the switcher(s) is defined by the INSTRUCTION (6 bits). Similarly, if a function is performed via the machine's keyboard, then these bits are set with the INSTRUCTION NO., which was performed. The instruction codes are defined according to the table below (INSTRUCTION NO. is the value to be set for N5…N0).

2nd BYTE: Bit 7 – Defined as 1.
I6…I0 – "INPUT".
When switching (ie. instruction codes 1 and 2), the INPUT (7 bits) is set as the input number which is to be switched. Similarly, if switching is done via the machine's front-panel, then these bits are set with the INPUT NUMBER which was switched. For other operations, these bits are defined according to the table.

3rd BYTE: Bit 7 – Defined as 1.
O6…O0 – "OUTPUT".
When switching (ie. instruction codes 1 and 2), the OUTPUT (7 bits) is set as the output number which is to be switched. Similarly, if switching is done via the machine's front-panel, then these bits are set with the OUTPUT NUMBER which was switched. For other operations, these bits are defined according to the table.

4th BYTE: Bit 7 – Defined as 1.
Bit 5 – Don't care.
OVR – Machine number override.
M4…M0 – MACHINE NUMBER.
Used to address machines in a system via their machine numbers. When several machines are controlled from a single serial port, they are usually configured together with each machine having an individual machine number. If the OVR bit is set, then all machine numbers will accept (implement) the command, and the addressed machine will reply.

1 The instruction codes in Table 6 are a sub-set of the Protocol 2000. The full protocol is available from http://www.kramerelectronics.com

For a single machine controlled via the serial port, always set M4…M0 = 1, and make sure that the machine itself is configured as MACHINE NUMBER = 1.

Table 6: Instruction Codes for Protocol 2000

Note: All values in the table are decimal, unless otherwise stated.

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
0	RESET VIDEO	0	0	1
1	SWITCH VIDEO	Set equal to video input which is to be switched (0 = disconnect)	Set equal to video output which is to be switched (0 = to all the outputs)	2, 15
3	STORE VIDEO STATUS	Set as SETUP #	0 - to store 1 - to delete	2, 3, 15
4	RECALL VIDEO STATUS	Set as SETUP #	0	2, 3, 15
5	REQUEST STATUS OF A VIDEO OUTPUT	Set as SETUP #	Equal to output number whose status is reqd	4, 3
15	REQUEST WHETHER SETUP IS DEFINED / VALID INPUT IS DETECTED	SETUP # or Input #	0 - for checking if setup is defined 1 - for checking if input is valid	8
30	LOCK FRONT PANEL	0 - Panel unlocked 1 - Panel locked	0	2
31	REQUEST WHETHER PANEL IS LOCKED	0	0	16
61	IDENTIFY MACHINE	1 - video machine name 2 - audio machine name 3 - video software version 4 - audio software version 5 - RS422 controller name 6 - RS422 controller version 7 - remote control name 8 - remote software version 9 - Protocol 2000 revision	0 - Request first 4 digits 1 - Request first suffix 2 - Request second suffix 3 - Request third suffix 10 - Request first prefix 11 - Request second prefix 12 - Request third prefix	13
62	DEFINE MACHINE	1 - number of inputs 2 - number of outputs 3 - number of setups	1 - for video 2 - for audio 3 - for SDI 4 - for remote panel 5 - for RS-422 controller	14

NOTES on the above table:

NOTE 1 - When the master switcher is reset, (e.g. when it is turned on), the reset code is sent to the PC. If this code is sent to the switchers, it will reset according to the present power-down settings.

NOTE 2 - These are bi-directional definitions. That is, if the switcher receives the code, it will perform the instruction; and if the instruction is performed (due to a keystroke operation on the front panel), then these codes are sent. For example, if the HEX code
01 85 88 83
was sent from the PC, then the switcher (machine 3) will switch input 5 to output 8. If the user switched input 1 to output 7 via the front panel keypad, then the switcher will send HEX codes:
41 81 87 83
to the PC.
When the PC sends one of the commands in this group to the switcher, then, if the instruction is valid, the switcher replies by sending to the PC the same four bytes that it was sent (except for the first byte, where the DESTINATION bit is set high).

NOTE 3 - SETUP # 0 is the present setting. SETUP # 1 and higher are the settings saved in the switcher's memory, (i.e. those used for Store and Recall).

NOTE 4 - The reply to a "REQUEST" instruction is as follows: the same instruction and INPUT codes as were sent are returned, and the OUTPUT is assigned the value of the requested parameter. The replies to instructions 10 and 11 are as per the definitions in instructions 7 and 8 respectively. For example, if the present status of machine number 5 is breakaway setting, then the reply to the HEX code

0B 80 80 85
would be HEX codes
4B 80 81 85

NOTE 8 - The reply is as in TYPE 3 above, except that here the OUTPUT is assigned with the value 0 if the setup is not defined / no valid input is detected; or 1 if it is defined / valid input is detected.

NOTE 13 - This is a request to identify the switcher/s in the system. If the OUTPUT is set as 0, and the INPUT is set as 1, 2, 5 or 7, the machine will send its name. The reply is the decimal value of the INPUT and OUTPUT. For example, for a 2216, the reply to the request to send the audio machine name would be (HEX codes):

7D 96 90 81 (i.e. 128dec+ 22dec for 2nd byte, and 128dec+ 16dec for 3rd byte).

If the request for identification is sent with the INPUT set as 3 or 4, the appropriate machine will send its software version number. Again, the reply would be the decimal value of the INPUT and OUTPUT - the INPUT representing the number in front of the decimal point, and the OUTPUT representing the number after it. For example, for version 3.5, the reply to the request to send the version number would be (HEX codes):

7D 83 85 81 (i.e. 128dec+ 3dec for 2nd byte, 128dec+ 5dec for 3rd byte).

If the OUTPUT is set as 1, then the ASCII coding of the lettering following the machine's name is sent. For example, for the VS-7588YC, the reply to the request to send the first suffix would be (HEX codes):

7D D9 C3 81 (i.e. 128dec+ ASCII for "Y"; 128dec+ ASCII for "C").

NOTE 14 - The number of inputs and outputs refers to the specific machine which is being addressed, not to the system. For example, if six 16X16 matrices are configured to make a 48X32 system (48 inputs, 32 outputs), the reply to the HEX code

3E 82 81 82 (ie. request the number of outputs)

would be HEX codes

7E 82 90 82

ie. 16 outputs

NOTE 15 – When the OVR bit (4th byte) is set, then the "video" commands have universal meaning. For example, instruction 1 (SWITCH VIDEO) will cause all units (including audio, data, etc.) to switch. Similarly, if a machine is in "FOLLOW" mode, it will perform any "video" instruction.

NOTE 16 - The reply to the "REQUEST WHETHER PANEL IS LOCKED" is as in NOTE 4 above, except that here the OUTPUT is assigned with the value 0 if the panel is unlocked, or 1 if it is locked.

LIMITED WARRANTY

We warrant this product free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for seven years from the date of the first customer purchase.

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by us or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the Web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed, or on which the WARRANTY VOID IF TAMPERED sticker has been torn, reattached, removed or otherwise interfered with.
3. Damage, deterioration or malfunction resulting from:
   i) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
   ii) Product modification, or failure to follow instructions supplied with the product
   iii) Repair or attempted repair by anyone not authorized by Kramer
   iv) Any shipment of the product (claims must be presented to the carrier)
   v) Removal or installation of the product
   vi) Any other cause, which does not relate to a product defect
   vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

This equipment has been tested to determine compliance with the requirements of:

EN-50081:	"Electromagnetic compatibility (EMC); generic emission standard. Part 1: Residential, commercial and light industry"
EN-50082:	"Electromagnetic compatibility (EMC) generic immunity standard. Part 1: Residential, commercial and light industry environment".
CFR-47:	FCC* Rules and Regulations: Part 15: “Radio frequency devices Subpart B Unintentional radiators”

CAUTION!

- Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- Use the supplied DC power supply to feed power to the machine.
- Please use recommended interconnection cables to connect the machine to other components.

* FCC and CE approved using STP cable (for twisted pair products)

For the latest information on our products and a list of Kramer distributors visit www.kramerelectronics.com **where updates to this user manual may be found. We welcome your questions, comments and feedback.**

Safety Warning:
Disconnect the unit from the power supply before opening/servicing.

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P/N: 2900-000723 REV 3